

System Programming & OS 실습

3. SSH and Terminal

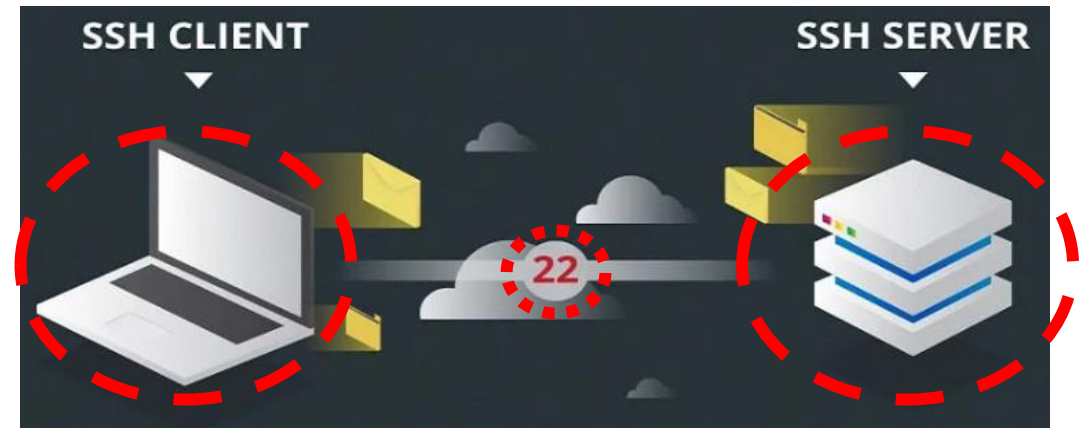
이성현, 최민국

Dankook University

{leesh812, mgchoi}@dankook.ac.kr

- SSH (Secure SHell)

- 네트워크 상의 다른 컴퓨터에 로그인, 원격제어 프로토콜
- Terminal을 통해 다른 컴퓨터를 관리하고 파일을 공유할 수 있음
- Client와 Server의 통신이 암호화되어 보안적으로 안전하게 통신



```
Command Prompt
Microsoft Windows [Version 10.0.22621.1265]
(c) Microsoft Corporation. All rights reserved.

C:\Users\한예진>ipconfig

Windows IP Configuration

Ethernet adapter 이더넷 4:

    Connection-specific DNS Suffix  . : 
    Link-local IPv6 Address . . . . . : fe80::1f9b:778d:9b32:aa94%60
    IPv4 Address. . . . . : 
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 

Wireless LAN adapter Wi-Fi:

    Connection-specific DNS Suffix  . : 
    IPv6 Address. . . . . : 2001:e60:8759:d3ef:ab19:c463:9ee6:ca5e
    Temporary IPv6 Address. . . . . : 2001:e60:8759:d3ef:dd1c:7f9b:ac00:c306
    Link-local IPv6 Address . . . . . : fe80::7e40:203e:20a5:db78%12
    IPv4 Address. . . . . : 192.168.
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : fe80::9c93:b6ff:fe8a:dd74%12
                                192.168.229.131
```

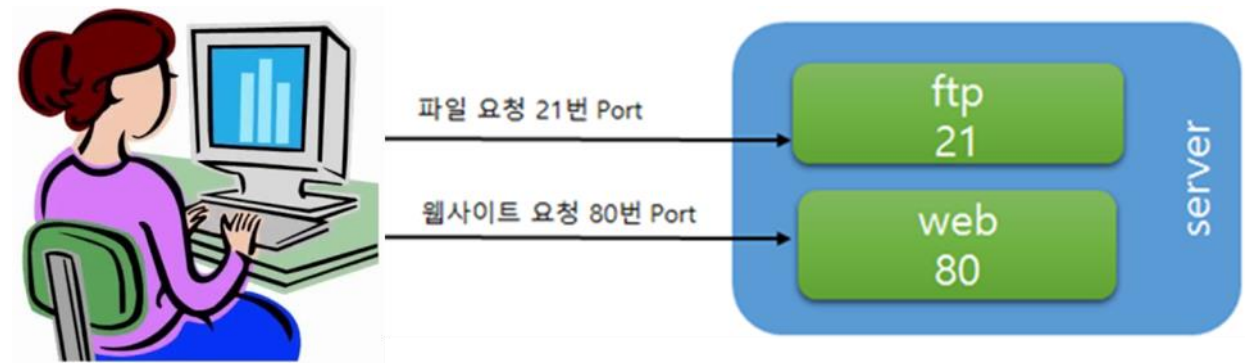
Host IP

VM IP

- 시작키에서 cmd 실행
- IP 정보 확인 명령어 : ipconfig

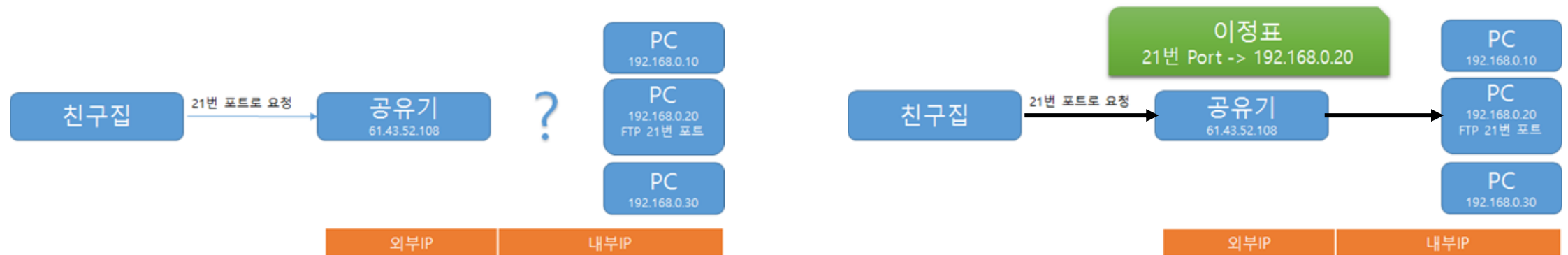
- Port

- 통신을 필요로 하는 프로그램이 다수일 때 이를 구별할 수 있는 번호
- 각각의 응용 프로그램에 이미 정해진 포트 번호를 이용해 구분
- ex) 21: FTP, 22: SSH, 80: HTTP, 115: SFTP, ...



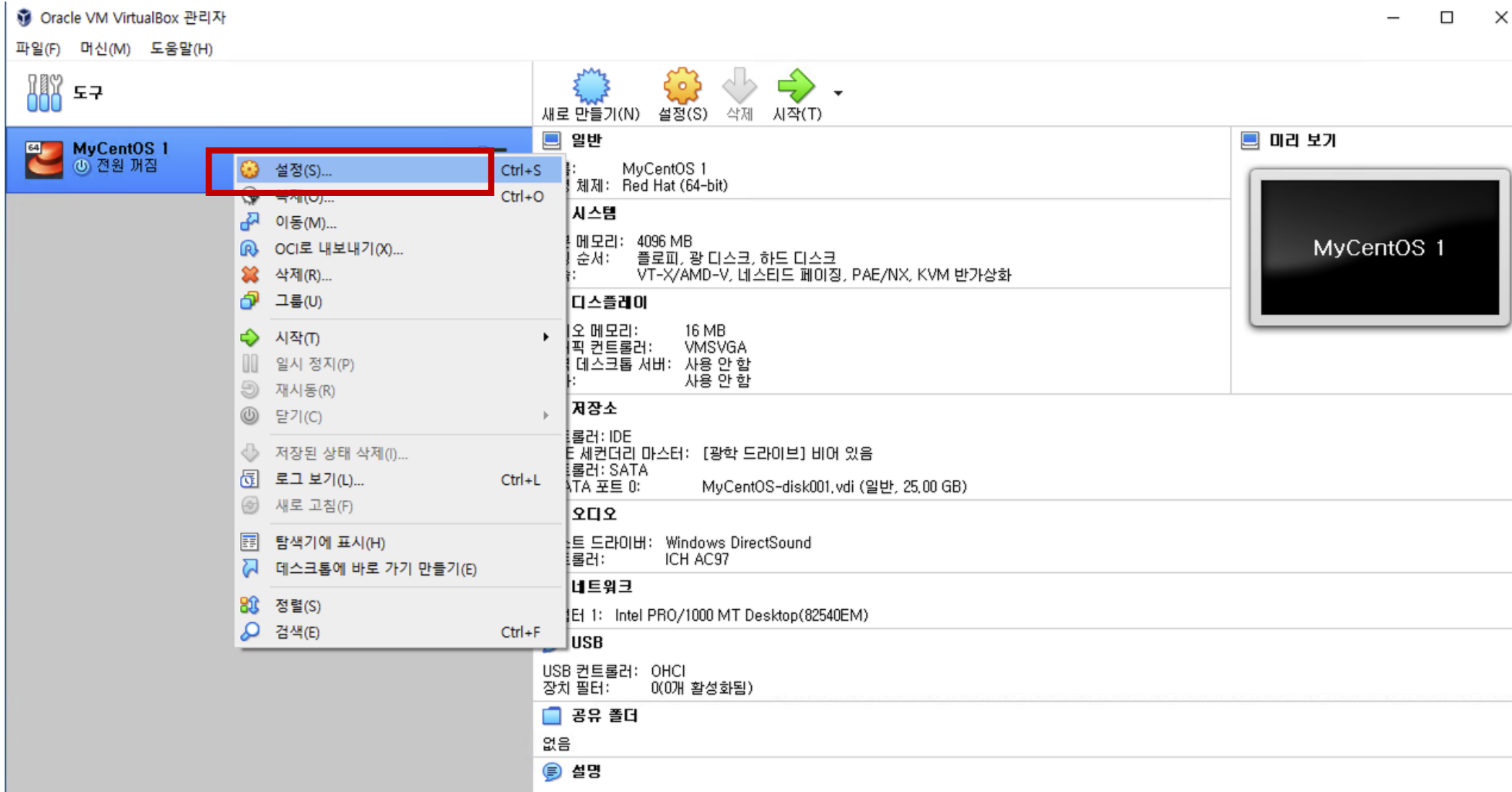
- Port Forwarding

- 특정한 포트로 들어오는 데이터 패킷을 다른 포트로 바꿔서 다시 전송해주는 포트 전달
- 외부에서 공유기에 연결된 PC에 통신을 요청할 때, 공유기에 이정표를 달아주는 작업
- ex) 21번 포트로 요청이 오면 공유기는 이정표를 참조해 192.168.0.20번 PC로 전달 가능



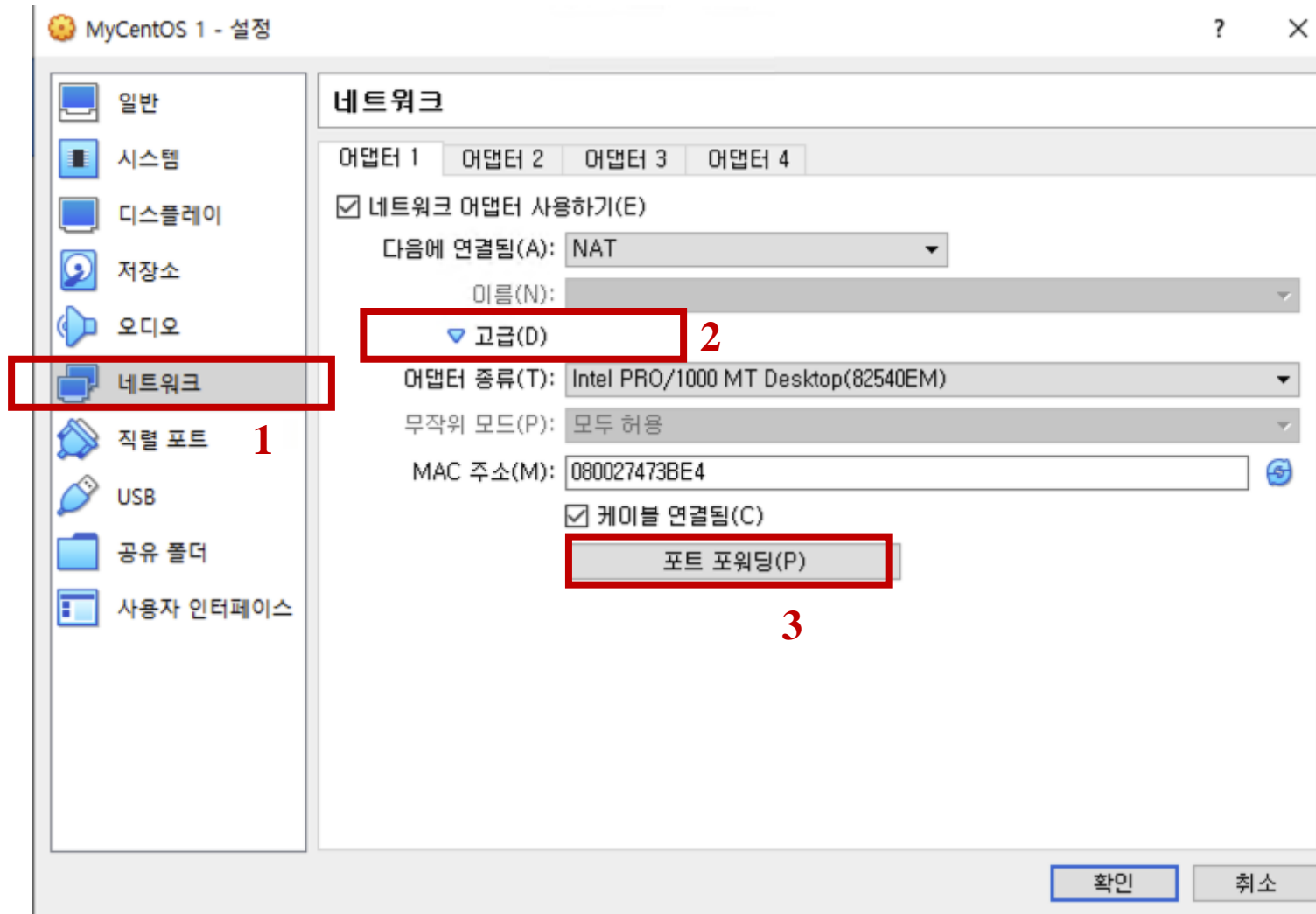
VirtualBox Port Forwarding

6



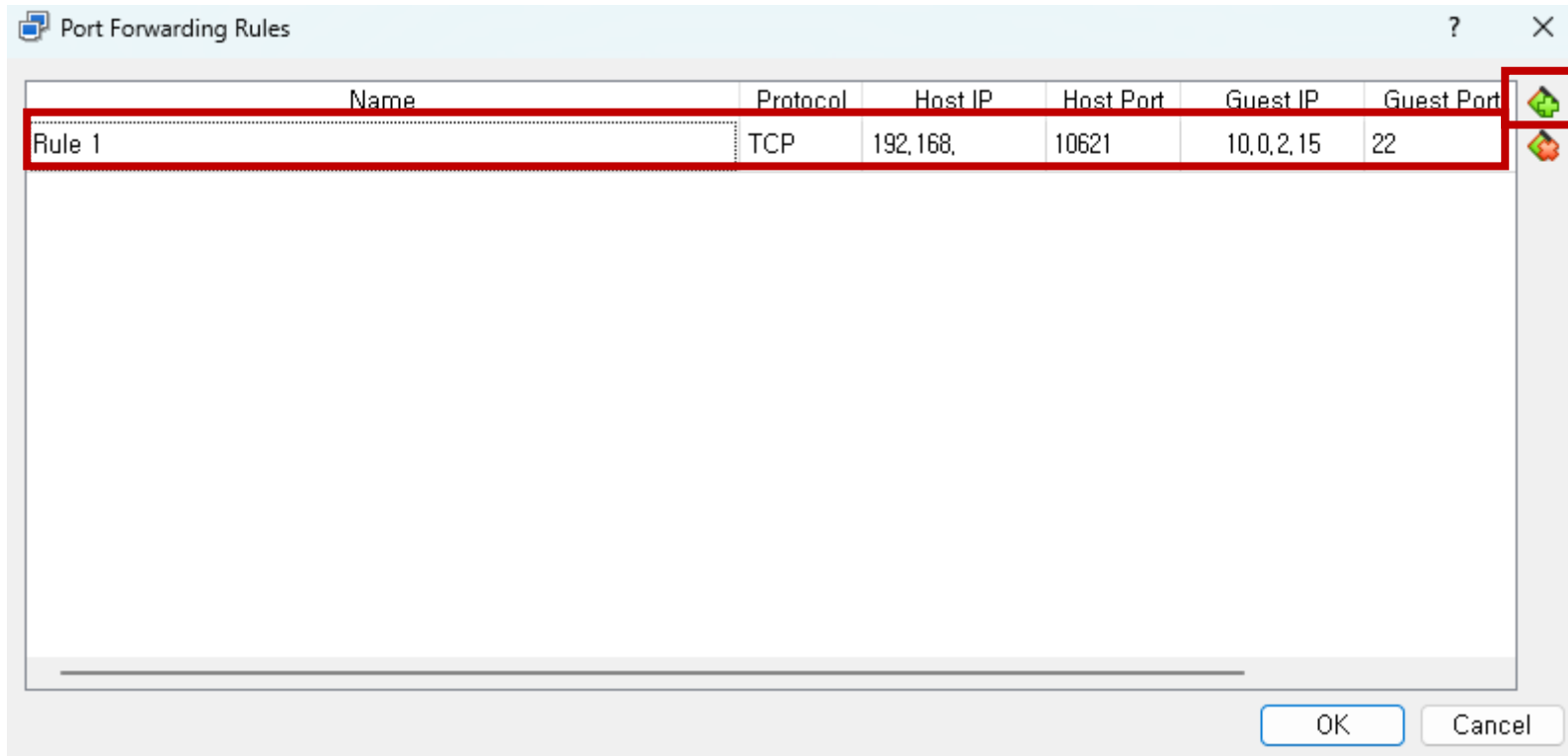
VirtualBox Port Forwarding

7



VirtualBox Port Forwarding

8



1

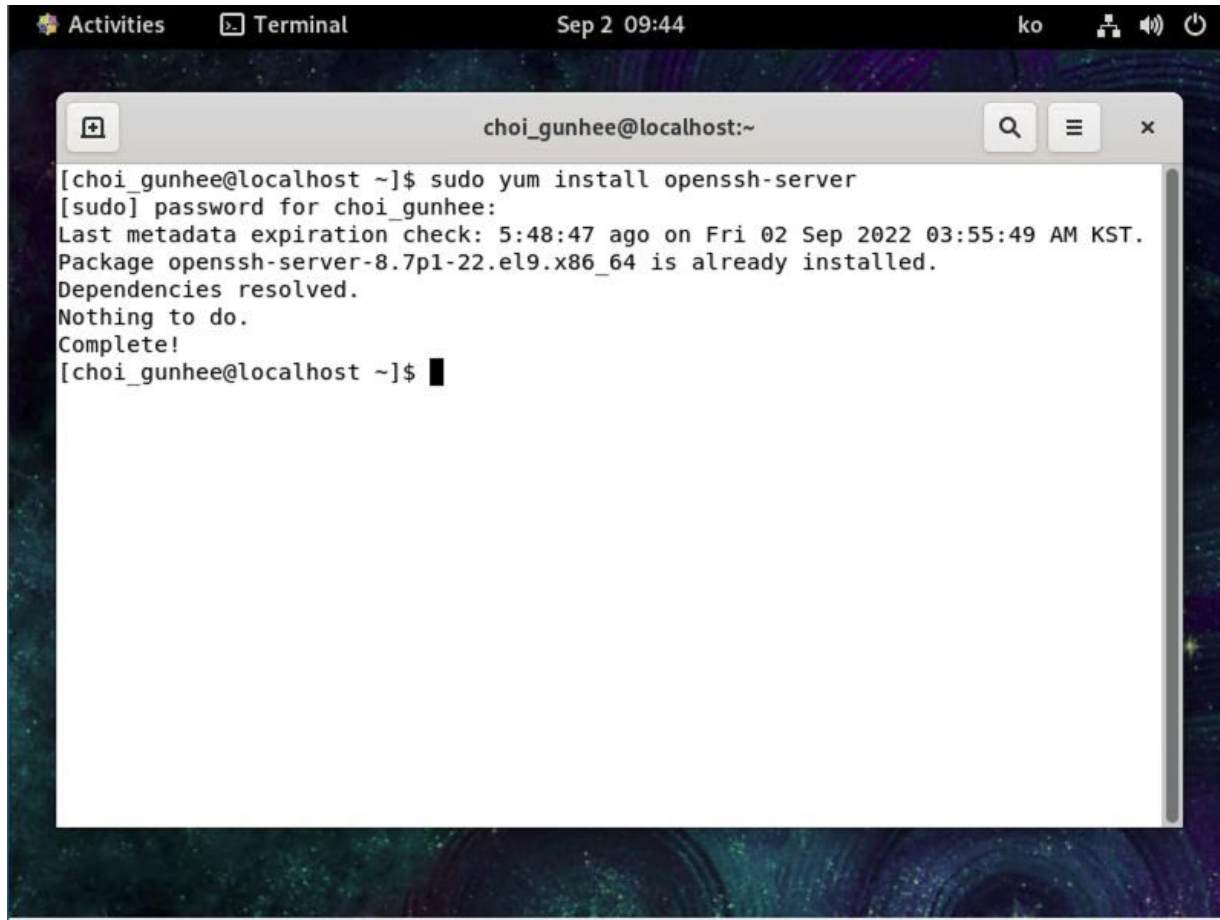
호스트 IP
192.168.xxx.xxx

호스트 port
10621 (임의)

게스트 IP
10.0.2.15

게스트 port
22

VM SSH 설치

A terminal window titled 'Terminal' with a date and time of 'Sep 2 09:44'. The window shows a user 'choi_gunhee@localhost' running the command 'sudo yum install openssh-server'. The output indicates that the package 'openssh-server-8.7p1-22.el9.x86_64' is already installed and dependencies are resolved. The terminal window has a search icon, a menu icon, and a close icon in the top right corner.

```
[choi_gunhee@localhost ~]$ sudo yum install openssh-server
[sudo] password for choi_gunhee:
Last metadata expiration check: 5:48:47 ago on Fri 02 Sep 2022 03:55:49 AM KST.
Package openssh-server-8.7p1-22.el9.x86_64 is already installed.
Dependencies resolved.
Nothing to do.
Complete!
[choi_gunhee@localhost ~]$
```

`sudo yum install openssh-server`

```
# If you want to change the port on a SELinux system, you have to tell
# SELinux about this change.
# semanage port -a -t ssh_port_t -p tcp #PORTNUMBER
#
Port 22
#AddressFamily any
#ListenAddress 0.0.0.0
#ListenAddress ::

#HostKey /etc/ssh/ssh_host_rsa_key
#HostKey /etc/ssh/ssh_host_ecdsa_key
#HostKey /etc/ssh/ssh_host_ed25519_key
■
# Ciphers and keying
#RekeyLimit default none
```

sudo vim /etc/ssh/sshd_config

주석제거

```
choi_gunhee@localhost:~ — /bin/systemctl status sshd.service
[choi_gunhee@localhost ~]$ sudo vim /etc/ssh/sshd_config
[choi_gunhee@localhost ~]$ service sshd status
Redirecting to /bin/systemctl status sshd.service
● sshd.service - OpenSSH server daemon
   Loaded: loaded (/usr/lib/systemd/system/sshd.service; enabled; vendor preset: enabled)
   Active: active (running) since Fri 2022-09-02 09:42:46 KST; 16min ago
     Docs: man:sshd(8)
           man:sshd_config(5)
  Main PID: 856 (sshd)
    Tasks: 1 (limit: 22992)
   Memory: 3.0M
      CPU: 9ms
   CGroup: /system.slice/sshd.service
           └─856 "sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups"

Sep 02 09:42:46 localhost systemd[1]: Starting OpenSSH server daemon...
Sep 02 09:42:46 localhost sshd[856]: Server listening on 0.0.0.0 port 22.
Sep 02 09:42:46 localhost sshd[856]: Server listening on :: port 22.
Sep 02 09:42:46 localhost systemd[1]: Started OpenSSH server daemon.
lines 1-16/16 (END)
```

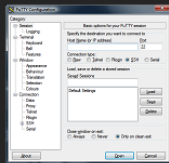
service sshd start
service sshd status

```
C:\Users\한예진>ssh yejin@192.168.      -p 10621
yejin@192.168.      's password:
Activate the web console with: systemctl enable --now cockpit.socket

Last login: Wed Mar  1 23:13:24 2023
[yejin@localhost ~]$ ls
Desktop  Documents  Downloads  Music  Pictures  Public  Templates  Videos
```

ssh userID@접속IP -p 포트번호

ex) ssh yejin@192.168.xxx.xxx -p 10621

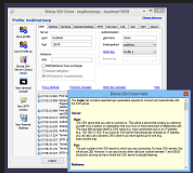


Download PuTTY

PuTTY is an SSH and telnet client, developed originally by Simon Tatham for the Windows platform. PuTTY is open source software that is available with source code and is developed and supported by a group of volunteers.

[Download PuTTY](https://www.putty.org/)

Below suggestions are independent of PuTTY. They are not endorsements by the PuTTY project.



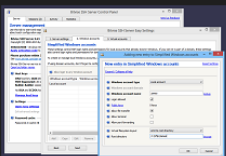
Bitvise SSH Client

Bitvise SSH Client is an SSH and SFTP client for Windows. It is developed and supported professionally by Bitvise. The SSH Client is robust, easy to install, easy to use, and supports all features supported by PuTTY, as well as the following:

- graphical SFTP file transfer;
- single-click Remote Desktop tunneling;
- auto-reconnecting capability;
- dynamic port forwarding through an integrated proxy;
- an FTP-to-SFTP protocol bridge.

Bitvise SSH Client is **free to use**.

[Download Bitvise SSH Client](#)



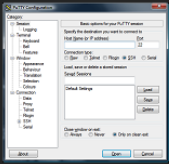
Bitvise SSH Server

Bitvise SSH Server is an SSH, SFTP and SCP server for Windows. It is robust, easy to install, easy to use, and works well with a variety of SSH clients, including Bitvise SSH Client, OpenSSH, and PuTTY. The SSH Server is developed and supported professionally by Bitvise.

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[FAQ](#)

<https://www.putty.org/>



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FAQ

Alternative binary files

The installer packages above will provide versions of all of these (except PuTTYtel and pterm)

(Not sure whether you want the 32-bit or the 64-bit version? Read the [FAQ entry](#).)

putty.exe (the SSH and Telnet client itself)

64-bit x86:	putty.exe	(signature)
64-bit Arm:	putty.exe	(signature)
32-bit x86:	putty.exe	(signature)

pscp.exe (an SCP client, i.e. command-line secure file copy)

64-bit x86:	pscp.exe	(signature)
64-bit Arm:	pscp.exe	(signature)
32-bit x86:	pscp.exe	(signature)

psftp.exe (an SFTP client, i.e. general file transfer sessions much like FTP)

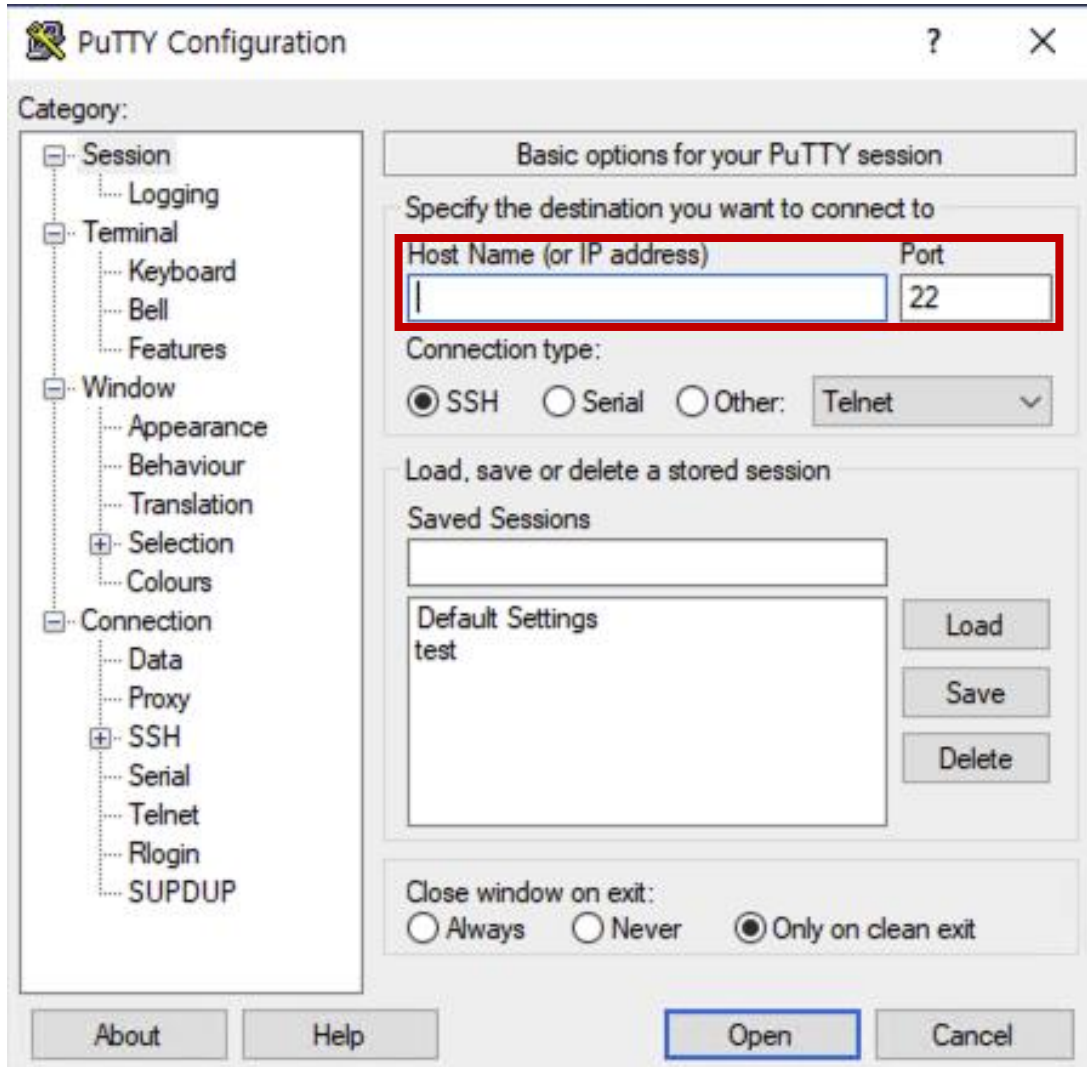
64-bit x86:	psftp.exe	(signature)
64-bit Arm:	psftp.exe	(signature)
32-bit x86:	psftp.exe	(signature)

puttytel.exe (a Telnet-only client)

64-bit x86:	puttytel.exe	(signature)
64-bit Arm:	puttytel.exe	(signature)
32-bit x86:	puttytel.exe	(signature)

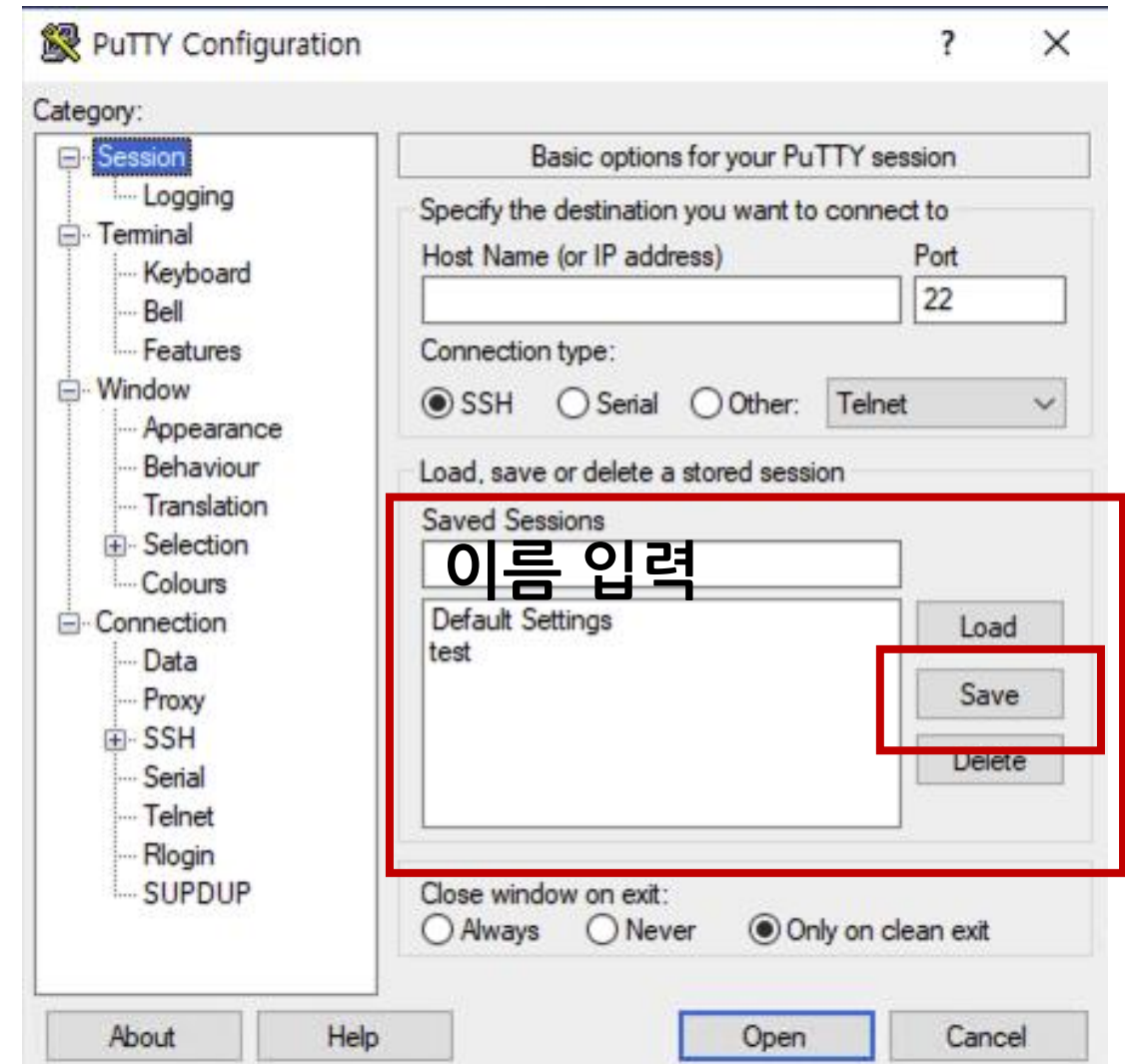
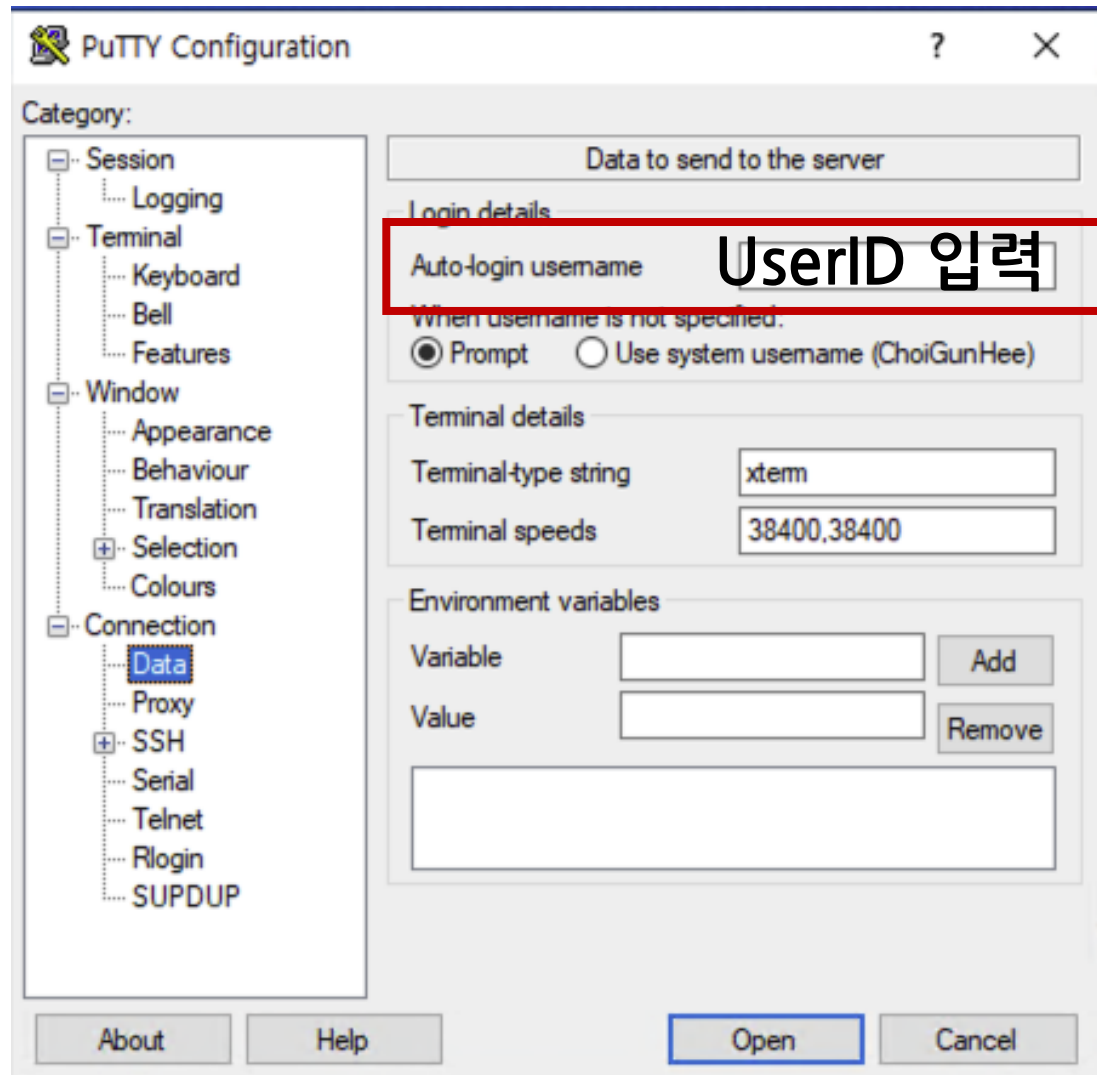
plink.exe (a command-line interface to the PuTTY back ends)

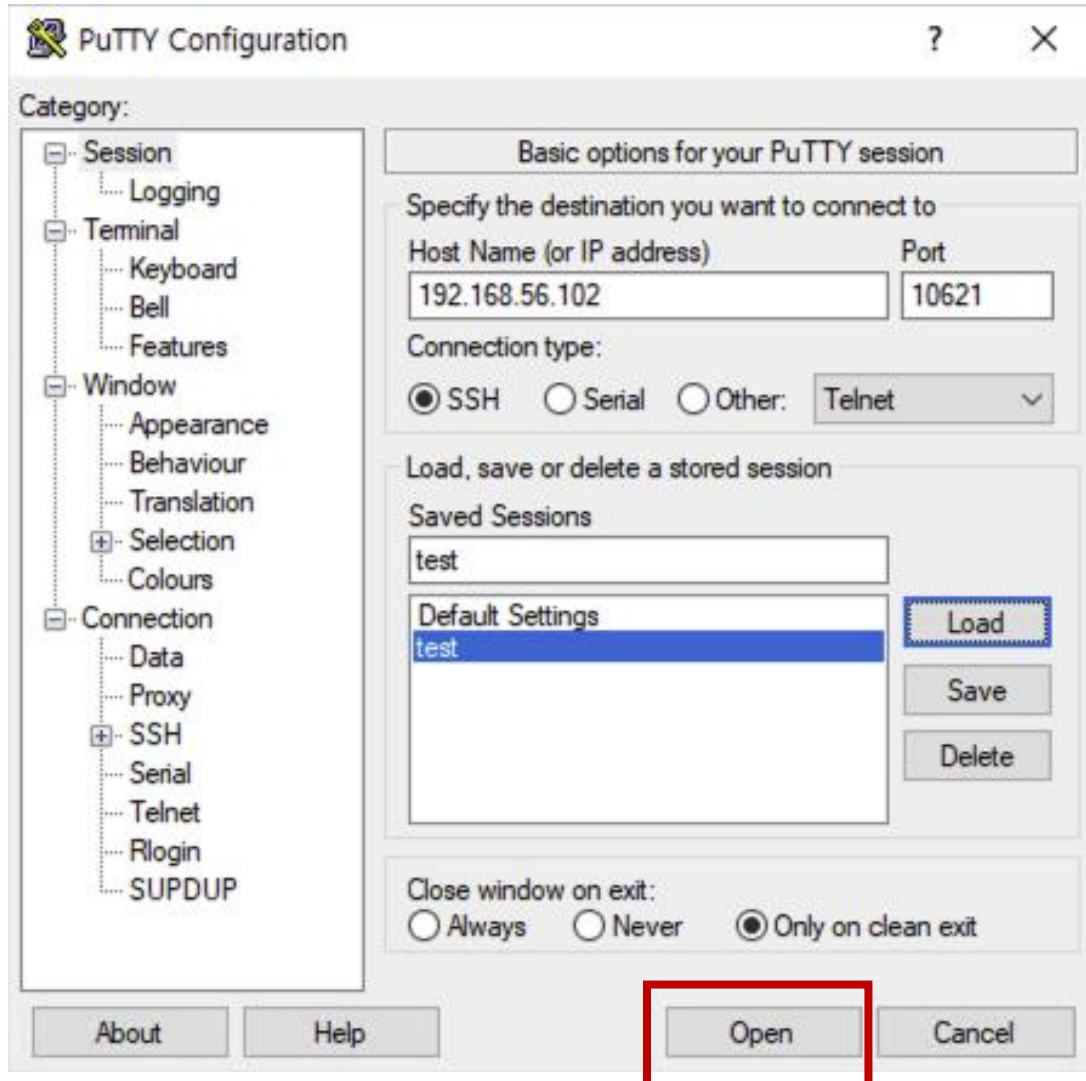
64-bit x86:	plink.exe	(signature)
64-bit Arm:	plink.exe	(signature)
32-bit x86:	plink.exe	(signature)



호스트 IP
192.168.229.155

호스트 port
10621 (임의)

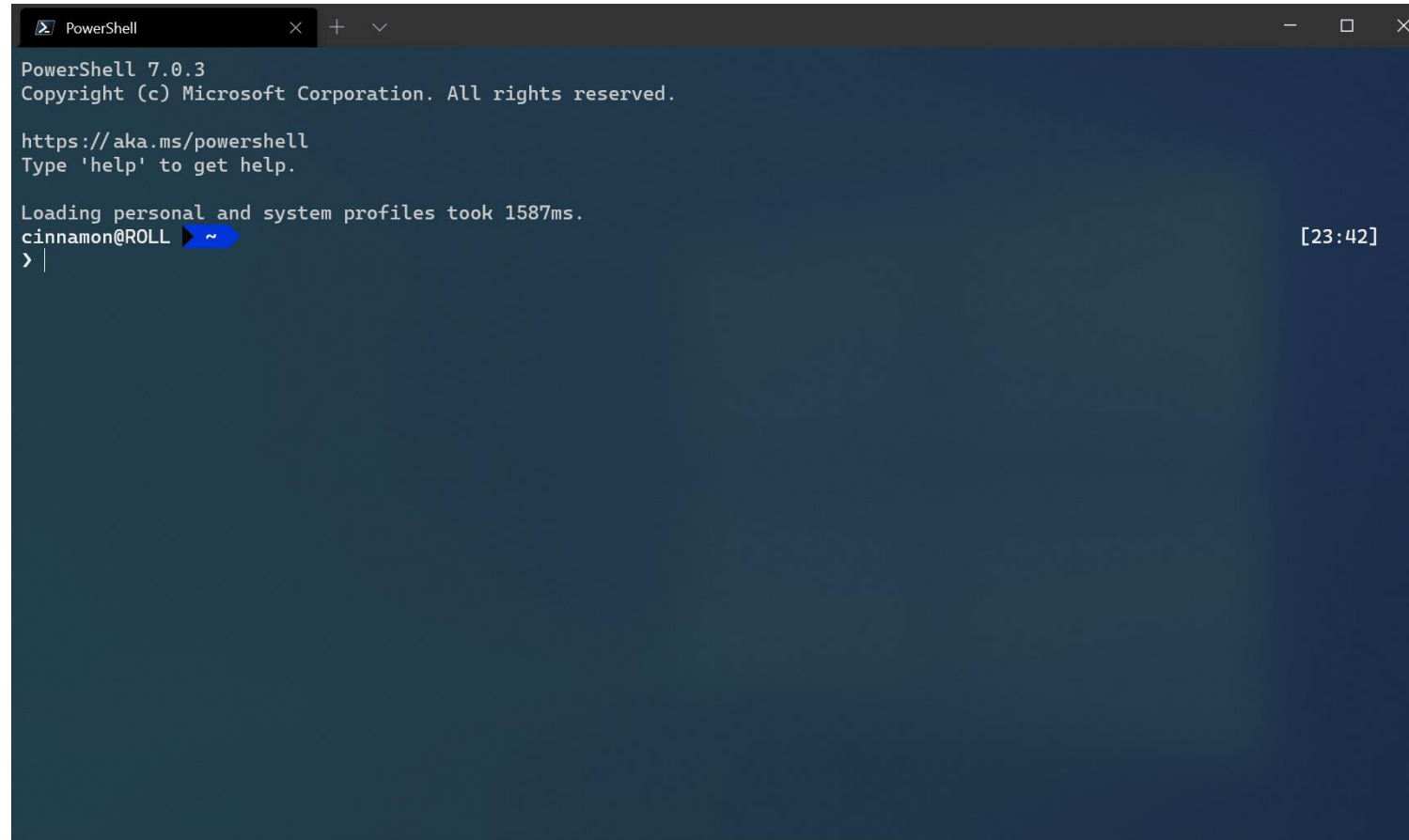




Windows Terminal

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<https://docs.microsoft.com/ko-kr/windows/terminal/install>

A screenshot of a Windows PowerShell terminal window. The title bar shows 'PowerShell' with standard window controls. The terminal text includes: 'PowerShell 7.0.3', 'Copyright (c) Microsoft Corporation. All rights reserved.', 'https://aka.ms/powershell', 'Type \'help\' to get help.', and 'Loading personal and system profiles took 1587ms.'. The prompt is 'cinnamon@ROLL ~' with a blue cursor. A timestamp '[23:42]' is in the bottom right corner.

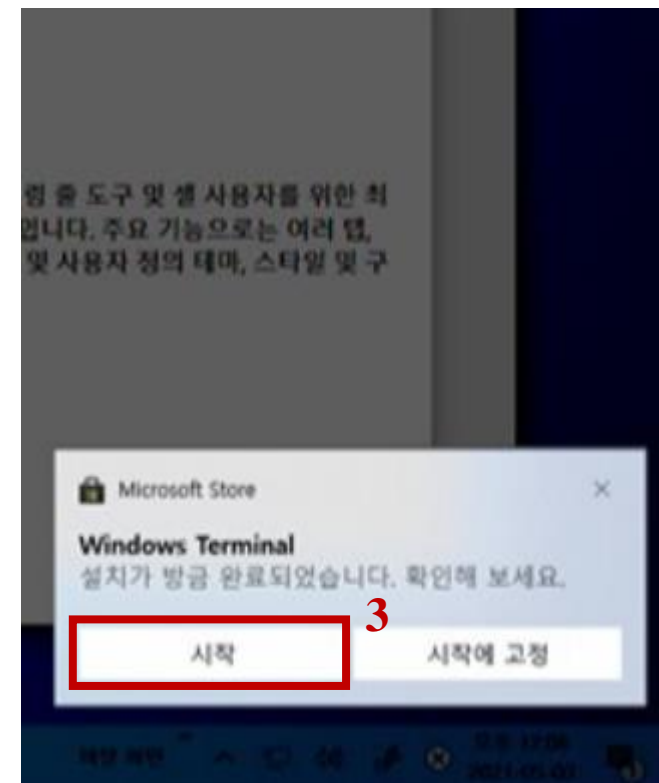
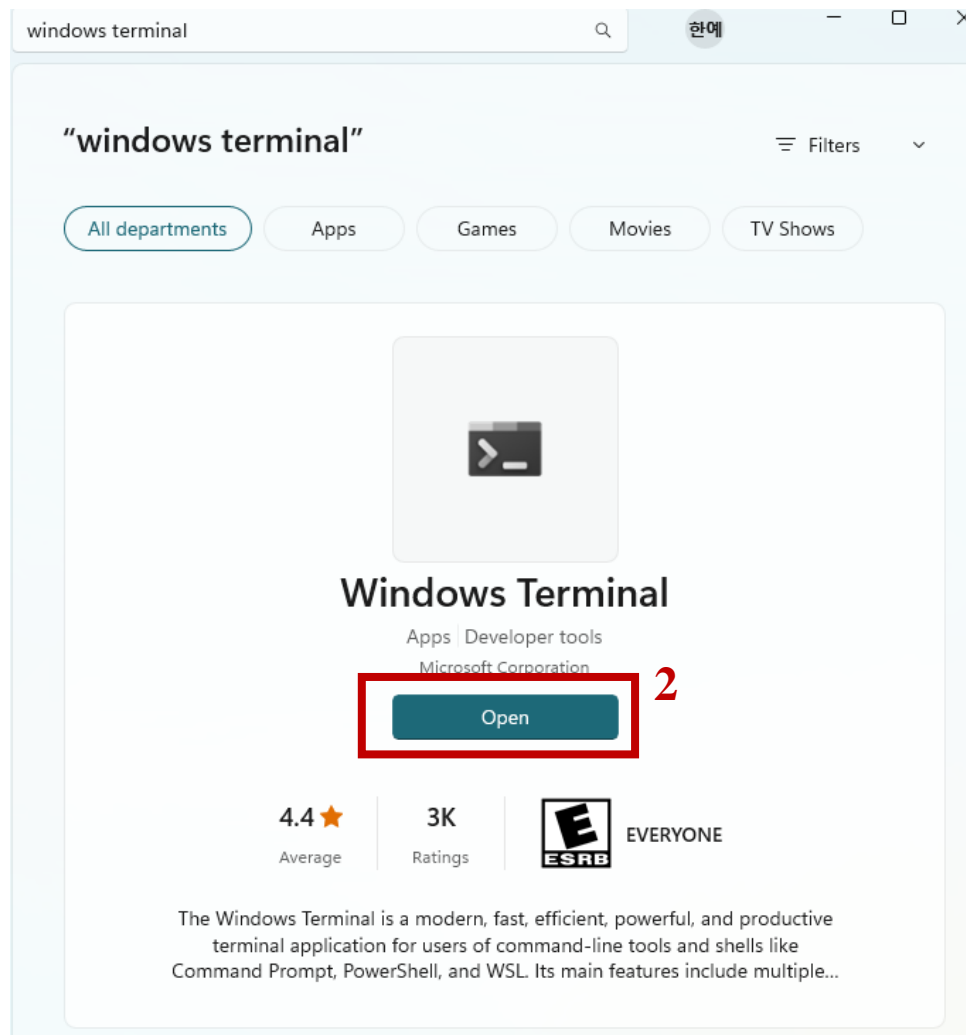
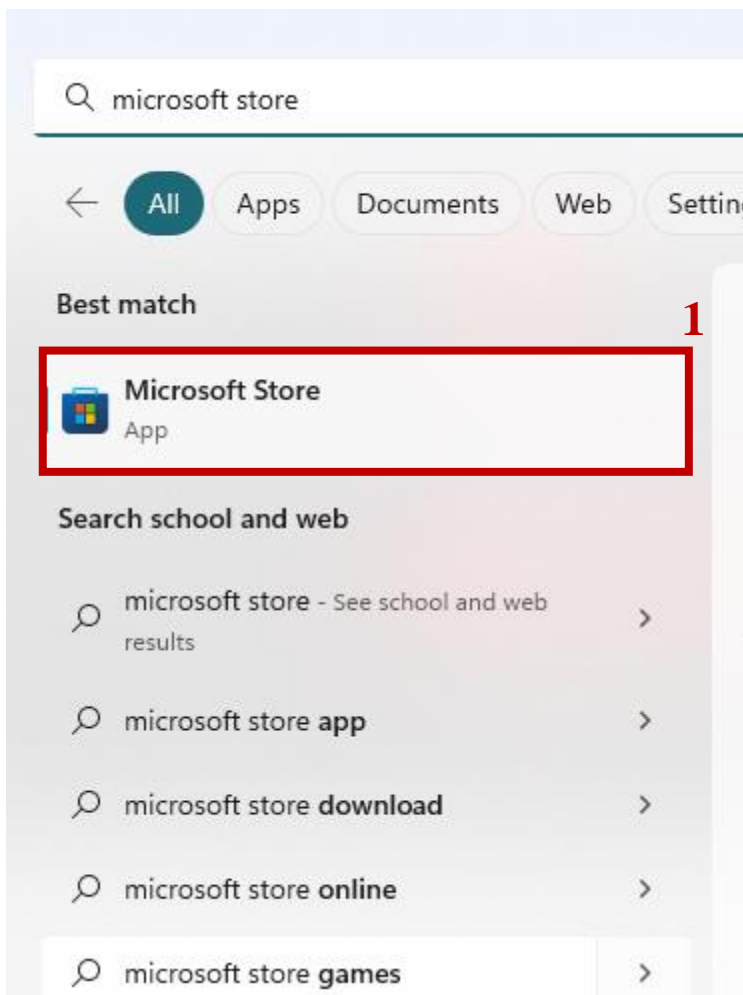
```
PowerShell 7.0.3
Copyright (c) Microsoft Corporation. All rights reserved.

https://aka.ms/powershell
Type 'help' to get help.

Loading personal and system profiles took 1587ms.
cinnamon@ROLL ~ [23:42]
> |
```

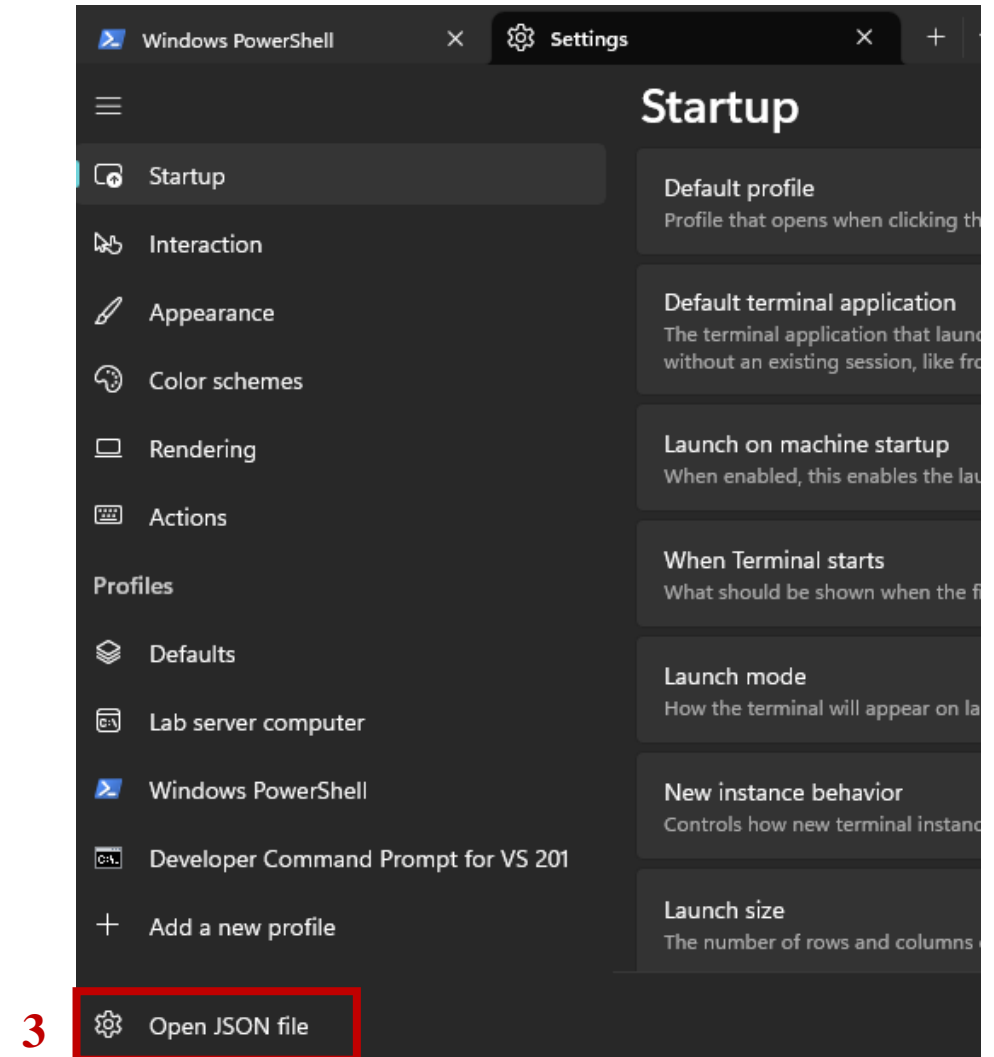
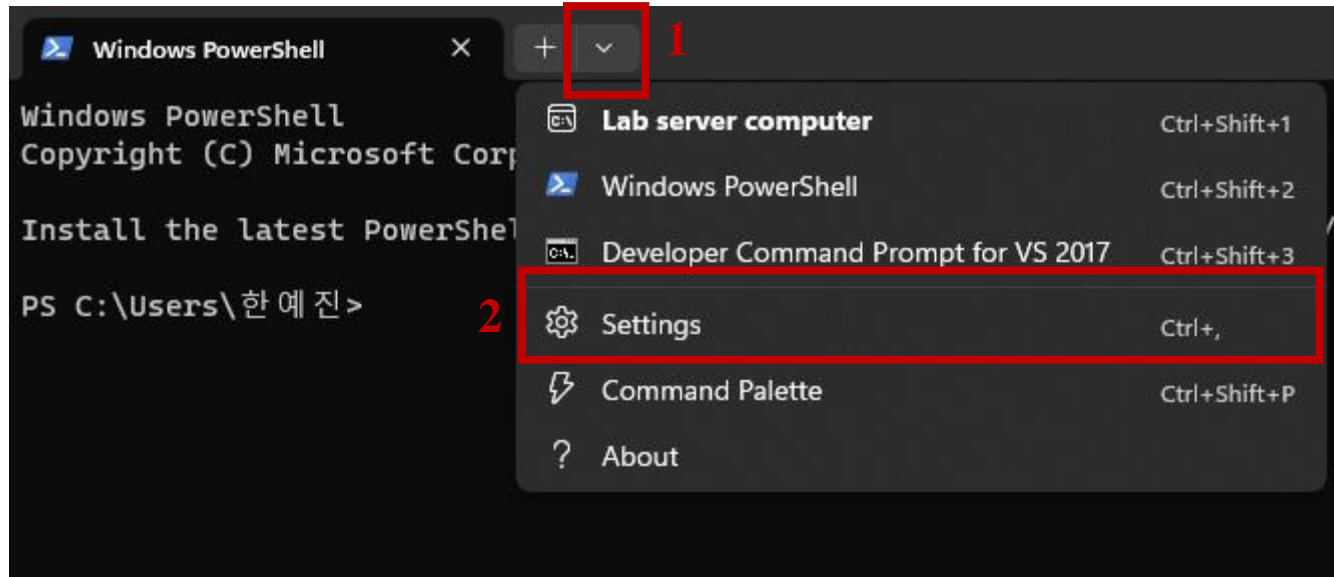
Windows Terminal 설치

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Windows Terminal 프로필 설정

20



```
42 "profiles":
43 {
44     "defaults":
45     {
46         "colorScheme": "Campbell",
47         "cursorShape": "bar"
48     },
49     "list":
50     [
51         {
52             "colorScheme": "Tango Dark",
53             "commandline": "ssh yejin@220.149.      ",
54             "cursorShape": "filledBox",
55             "guid": "{ea8151c5-62f1-40a9-bc0c-b6a9fab97733}",
56             "hidden": false,
57             "name": "Lab server computer",
58             "suppressApplicationTitle": true
59         },
60         {
61             "cursorShape": "filledBox",
62             "guid": "{61c54bbd-c2c6-5271-96e7-009a87ff44bf}",
63             "hidden": false,
64             "name": "Windows PowerShell"
65         }
66     ]
67 }
```

- name
 - 메뉴에 표시될 프로필 이름
 - 시작 시 셸에 전달할 제목으로 사용
- commandline
 - 프로필에 사용되는 실행 파일
 - ex) ssh yejin@220.149.xxx.xxx
- guid
 - 단지 구별을 위해 필요, 임의로 입력
 - Powershell로 쉽게 만들 수 있음

```
PS C:\Users\한예진> [guid]::NewGuid()

Guid
----
4b9eac4e-19d6-4bbe-a4d2-c58499b86246
```